



DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. FAA-2022-0989; Project Identifier AD-2022-00468-E; Amendment 39-22236; AD 2022-23-09]

RIN 2120-AA64

Airworthiness Directives; General Electric Company Turbofan Engines

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: The FAA is adopting a new airworthiness directive (AD) for certain General Electric Company (GE) GE90-90B, GE90-94B, GE90-110B1, and GE90-115B model turbofan engines. This AD was prompted by a manufacturer investigation that revealed that certain high-pressure turbine (HPT) stage 1 disks, HPT stage 2 disks, and stages 7-9 compressor rotor spools were manufactured from powder metal material suspected to contain iron inclusion. This AD requires the replacement of the affected HPT stage 1 disks, HPT stage 2 disks, and stages 7-9 compressor rotor spools. The FAA is issuing this AD to address the unsafe condition on these products.

DATES: This AD is effective [INSERT DATE 35 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

ADDRESSES:

AD Docket: You may examine the AD docket at [regulations.gov](https://www.regulations.gov) by searching for and locating Docket No. FAA-2022-0989; or in person at Docket Operations between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this final rule, any comments received, and other information. The address for Docket Operations is U.S. Department of Transportation, Docket Operations, M-30, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue SE, Washington, DC 20590.

FOR FURTHER INFORMATION CONTACT: Alexei Marqueen, Aviation Safety Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA 01803; phone: (781) 238-7178; email: Alexei.T.Marqueen@faa.gov.

SUPPLEMENTARY INFORMATION:

Background

The FAA issued a notice of proposed rulemaking (NPRM) to amend 14 CFR part 39 by adding an AD that would apply to certain GE GE90-90B, GE90-94B, GE90-110B1, and GE90-115B model turbofan engines. The NPRM published in the *Federal Register* on September 09, 2022 (87 FR 55319). The NPRM was prompted by a manufacturer investigation that revealed that certain HPT stage 1 disks, HPT stage 2 disks, and stages 7-9 compressor rotor spools were manufactured from powder metal material suspected to contain iron inclusion. Further investigation by the manufacturer determined that the iron inclusion is attributed to deficiencies in the manufacturing process. The investigation by the manufacturer also determined that certain HPT stage 1 disks, HPT stage 2 disks, and stages 7-9 compressor rotor spools made from billets manufactured using the same process may have reduced material properties and a lower fatigue life capability due to iron inclusion, which may cause premature fracture and uncontained failure. In the NPRM, the FAA proposed to require the replacement of certain HPT stage 1 disks, HPT stage 2 disks, and stages 7-9 compressor rotor spools. The FAA is issuing this AD to address the unsafe condition on these products.

Discussion of Final Airworthiness Directive

Comments

The FAA received comments from three commenters. The commenters were Air Line Pilots Association, International, FedEx Express, and The Boeing Company. All commenters supported the NPRM without change.

Conclusion

The FAA reviewed the relevant data, considered the comments received, and determined that air safety requires adopting the AD as proposed. Accordingly, the FAA is issuing this AD to address the unsafe condition on these products. This AD is adopted as proposed in the NPRM.

Related Service Information

The FAA reviewed the following service information issued by GE, which specifies procedures for removing the affected HPT stage 2 disk from service. These documents are distinct since they apply to different engine models.

- GE90-100 Service Bulletin 72-0893 R01, dated November 30, 2021.
- GE90-100 Service Bulletin 72-0899 R00, dated April 29, 2022.

The FAA also reviewed GE90-100 Service Bulletin 72-0897 R00, dated February 23, 2022. This service information specifies procedures for removing the affected stages 7-9 compressor rotor spool from service. The FAA also reviewed GE90 Service Bulletin 72-1214 R00, dated April 29, 2022. This service information specifies procedures for removing the affected HPT stage 1 disk and HPT stage 2 disk from service.

Costs of Compliance

The FAA estimates that this AD affects 1 engine installed on airplanes of U.S. registry. The FAA estimates that 0 engines installed on airplanes of U.S. registry require replacement of the HPT stage 1 disk or stages 7-9 compressor rotor spool.

The FAA estimates the following costs to comply with this AD:

Estimated costs

Action	Labor Cost	Parts Cost	Cost per product	Cost on U.S. operators
Replace HPT stage 2 disk	8 work-hours x \$85 per hour = \$680	\$459,473 (pro-rated)	\$460,153	\$460,153
Replace HPT stage 1 disk	8 work-hours x \$85 per hour = \$680	\$867,041 (pro-rated)	\$867,721	0
Replace stages 7-9 compressor rotor spool	8 work-hours x \$85 per hour = \$680	\$442,204 (pro-rated)	\$442,884	0

Authority for this Rulemaking

Title 49 of the United States Code specifies the FAA's authority to issue rules on aviation safety. Subtitle I, section 106, describes the authority of the FAA Administrator.

Subtitle VII: Aviation Programs, describes in more detail the scope of the Agency's authority.

The FAA is issuing this rulemaking under the authority described in Subtitle VII, Part A, Subpart III, Section 44701: General requirements. Under that section, Congress charges the FAA with promoting safe flight of civil aircraft in air commerce by prescribing regulations for practices, methods, and procedures the Administrator finds necessary for safety in air commerce. This regulation is within the scope of that authority because it addresses an unsafe condition that is likely to exist or develop on products identified in this rulemaking action.

Regulatory Findings

This AD will not have federalism implications under Executive Order 13132. This AD will not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.

For the reasons discussed above, I certify that this AD:

- (1) Is not a "significant regulatory action" under Executive Order 12866,
- (2) Will not affect intrastate aviation in Alaska, and
- (3) Will not have a significant economic impact, positive or negative, on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

List of Subjects in 14 CFR Part 39

Air transportation, Aircraft, Aviation safety, Incorporation by reference, Safety.

The Amendment

Accordingly, under the authority delegated to me by the Administrator, the FAA amends 14 CFR part 39 as follows:

PART 39 - AIRWORTHINESS DIRECTIVES

- 1. The authority citation for part 39 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701.

§ 39.13 [Amended]

- 2. The FAA amends § 39.13 by adding the following new airworthiness directive:

2022-23-09 General Electric Company: Amendment 39-22236; Docket No. FAA-2022-0989; Project Identifier AD-2022-00468-E.

(a) Effective Date

This airworthiness directive (AD) is effective [INSERT DATE 35 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

(b) Affected ADs

None.

(c) Applicability

This AD applies to General Electric Company GE90-90B, GE90-94B, GE90-110B1, and GE90-115B model turbofan engines with an installed high-pressure turbine (HPT) stage 1 disk, HPT stage 2 disk, or stages 7-9 compressor rotor spool with a part number (P/N) and serial number (S/N) identified in Table 1 to paragraph (c) of this AD.

Table 1 to Paragraph (c) – Affected HPT Stage 1 Disks, HPT Stage 2 Disks, and Stages 7-9 Compressor Rotor Spools

Part Name	P/N	S/N
HPT stage 1 disk	1847M95G04	GWN0R5K4
HPT stage 2 disk	1711M47G13	TMT5N068
HPT stage 2 disk	1865M14P04	TMT5P744
		TMT5P745
		TMT5P749
		TMT5P755
		TMT5P762
Stages 7-9 compressor rotor spool	2032M23G02	GWN0R5M5

(d) Subject

Joint Aircraft System Component (JASC) Code 7230, Turbine Engine Compressor Section; 7250, Turbine Section.

(e) Unsafe Condition

This AD was prompted by a manufacturer investigation that revealed that certain HPT stage 1 disks, HPT stage 2 disks, and stages 7-9 compressor rotor spools were manufactured from powder metal material suspected to contain iron inclusion. The FAA

is issuing this AD to prevent fracture and potential uncontained failure of certain HPT stage 1 disks, HPT stage 2 disks, and stages 7-9 compressor rotor spools. The unsafe condition, if not addressed, could result in uncontained debris release, damage to the engine, and damage to the aircraft.

(f) Compliance

Comply with this AD within the compliance times specified, unless already done.

(g) Required Actions

(1) Before exceeding 400 flight cycles after the effective date of this AD, remove the affected HPT stage 1 disk, HPT stage 2 disk, and stages 7-9 compressor rotor spool from service and replace with a part eligible for installation.

(2) For affected engines not in service, before further flight, remove the affected HPT stage 1 disk, HPT stage 2 disk, and stages 7-9 compressor rotor spool and replace with a part eligible for installation.

(h) Definitions

(1) For the purpose of this AD, a “part eligible for installation” is any HPT stage 1 disk, HPT stage 2 disk, or stages 7-9 compressor rotor spool with a P/N and S/N not identified in Table 1 to paragraph (c) of this AD.

(2) For the purpose of this AD, “affected engines not in service” are affected engines that are in long-term or short-term storage as of the effective date of this AD.

(i) Installation Prohibition

After the effective date of this AD, do not install an HPT stage 1 disk, HPT stage 2 disk, or stages 7-9 compressor rotor spool with a P/N and S/N identified in Table 1 to paragraph (c) of this AD onto any engine.

(j) Alternative Methods of Compliance (AMOCs)

(1) The Manager, ECO Branch, FAA, has the authority to approve AMOCs for this AD, if requested using the procedures found in 14 CFR 39.19. In accordance with 14 CFR 39.19, send your request to your principal inspector or local Flight Standards District Office, as appropriate. If sending information directly to the manager of the certification office, send it to the attention of the person identified in paragraph (k) of this AD and email to: ANE-AD-AMOC@faa.gov.

(2) Before using any approved AMOC, notify your appropriate principal inspector, or lacking a principal inspector, the manager of the local flight standards district office/certificate holding district office.

(k) Related Information

For more information about this AD, contact Alexei Marqueen, Aviation Safety Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA 01803; phone: (781) 238-7178; email: Alexei.T.Marqueen@faa.gov.

(l) Material Incorporated by Reference

None.

Issued on November 1, 2022.

Christina Underwood, Acting Director,
Compliance & Airworthiness Division,
Aircraft Certification Service.

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